



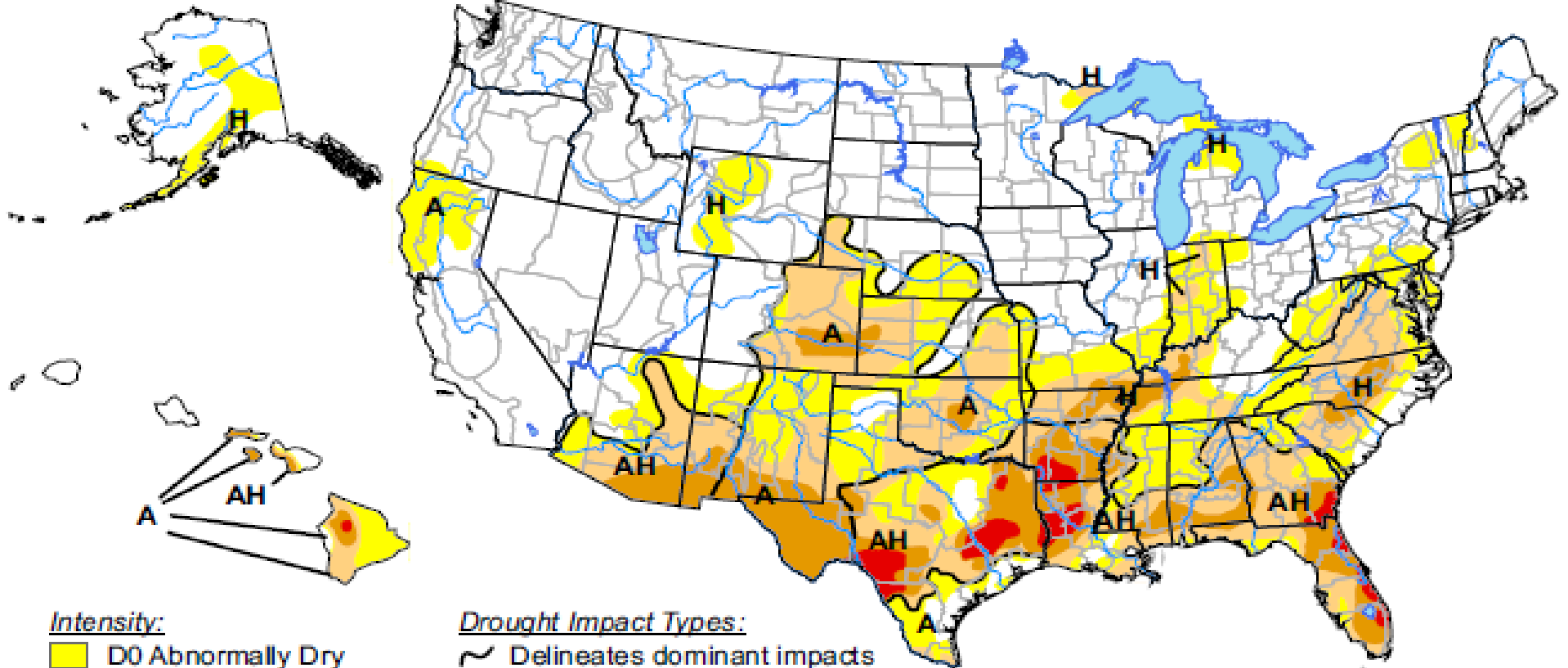
The Effects of Drought on Pecan Quality

Lenny Wells
University of Georgia






“If there is magic on this planet, it is
contained in water.”
---Loren Eiseley

U.S. Drought Monitor


February 15, 2011
Valid 7 a.m. EST



Intensity:

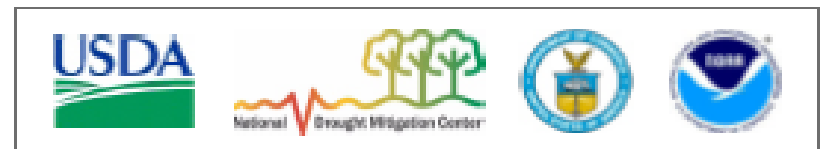
-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

Drought Impact Types:

-  Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>

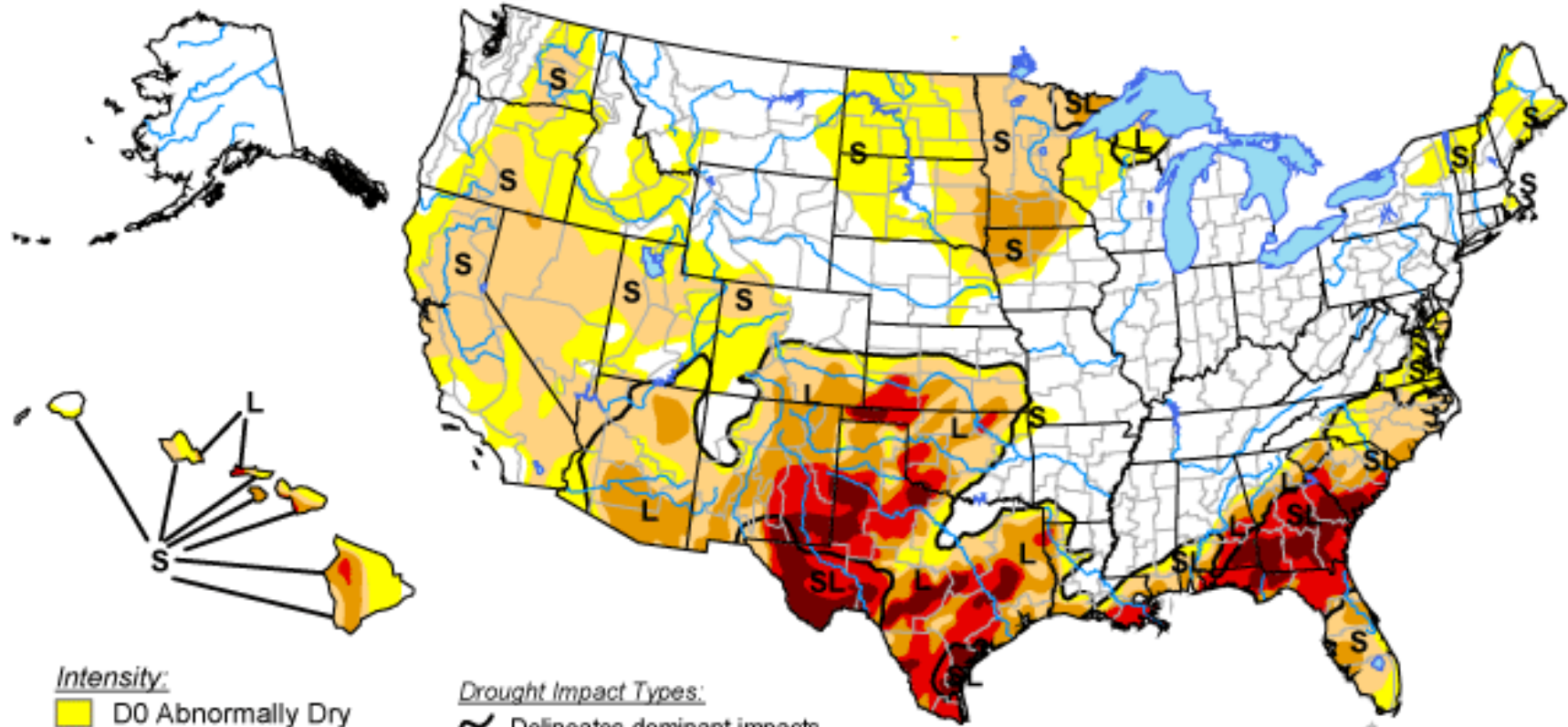


Released Thursday, February 17, 2011
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC






U.S. Drought Monitor

February 14, 2012


Valid 7 a.m. EST



Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

Drought Impact Types:

-  Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu/>



Released Thursday, February 16, 2012

Author: Rich Tinker, NOAA/NWS/NCEP/CPC

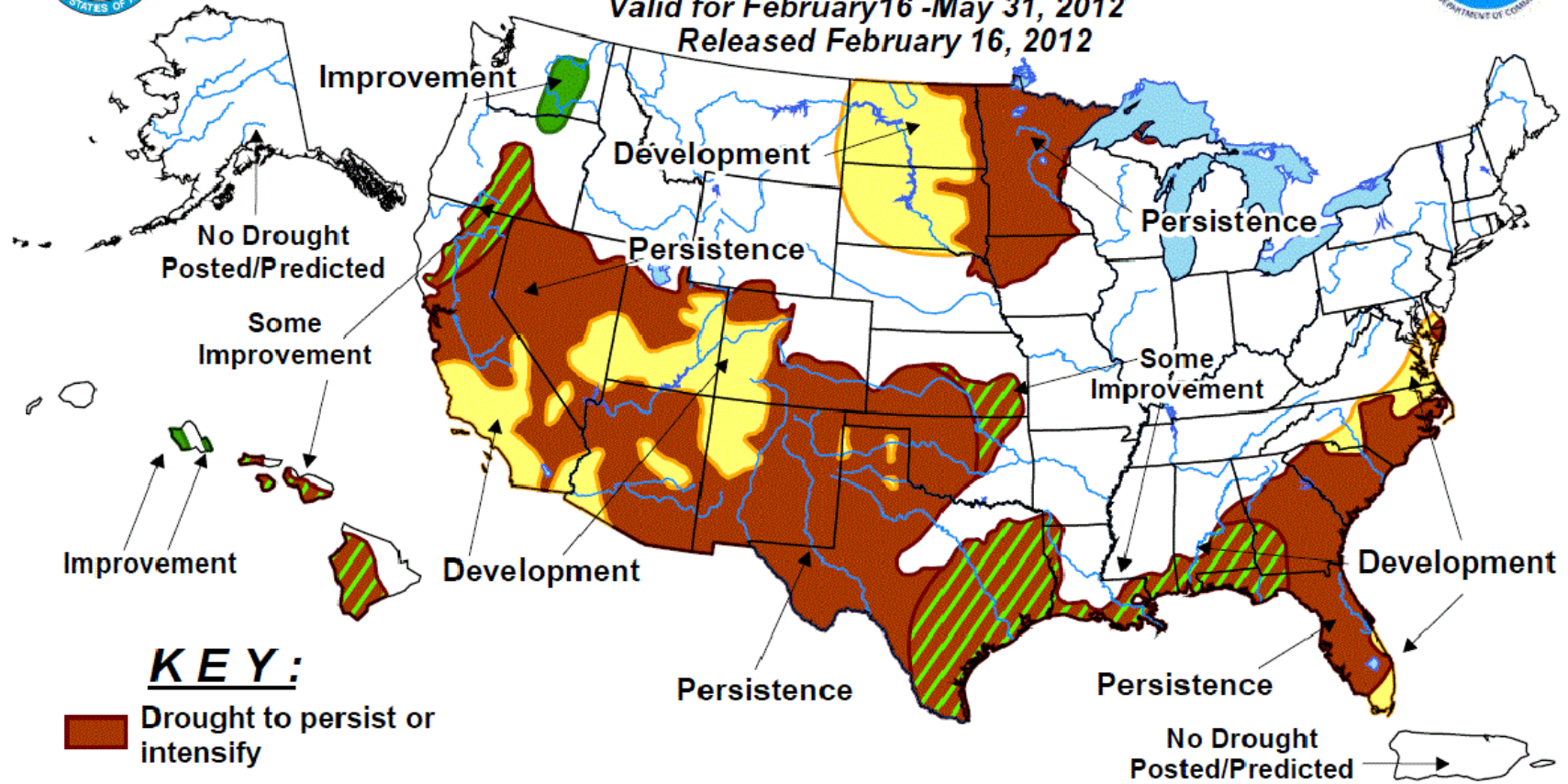


U.S. Seasonal Drought Outlook





Drought Tendency During the Valid Period

Valid for February 16 - May 31, 2012

Released February 16, 2012

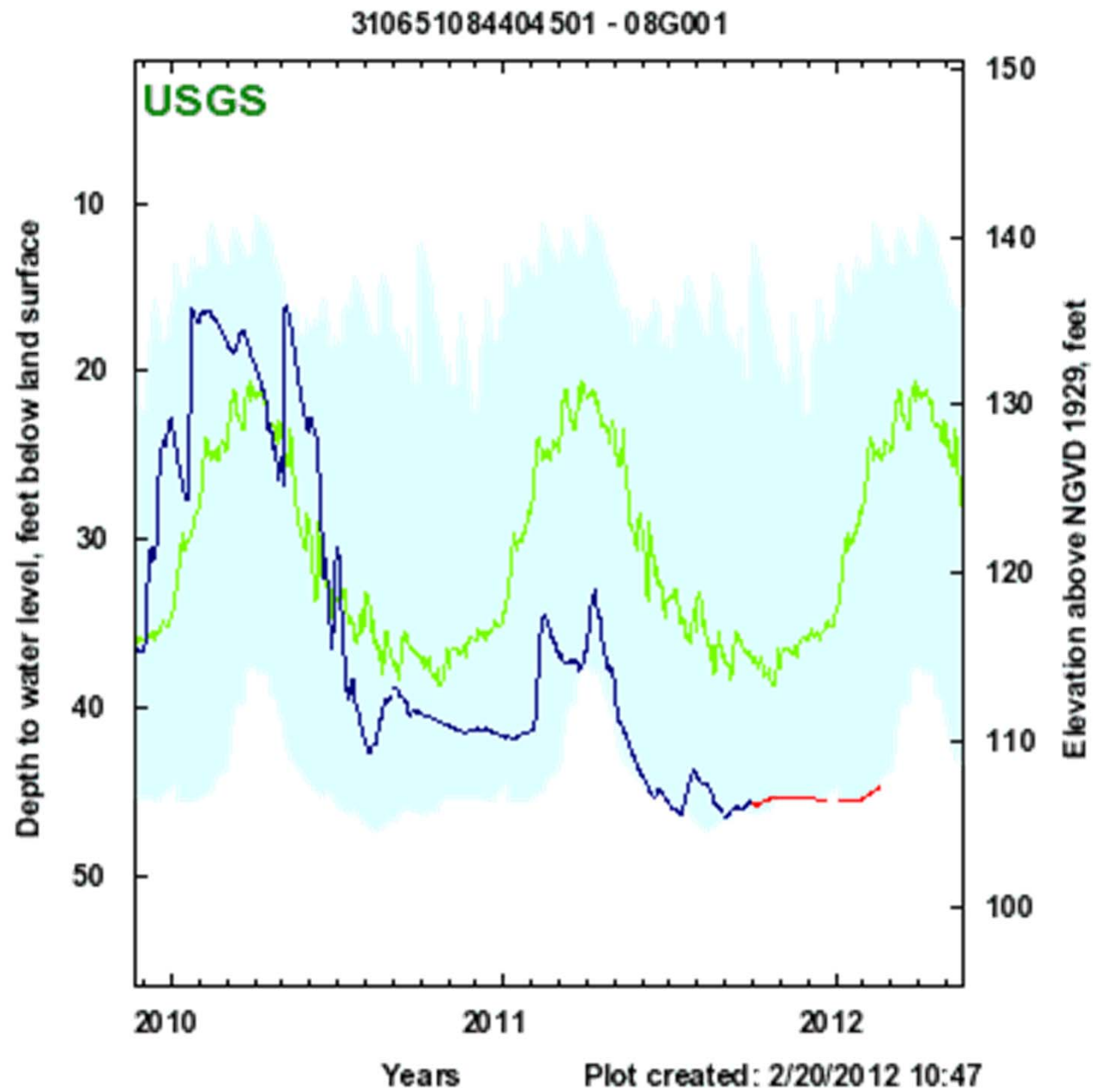


KEY:

-  Drought to persist or intensify
-  Drought ongoing, some improvement
-  Drought likely to improve, impacts ease
-  Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

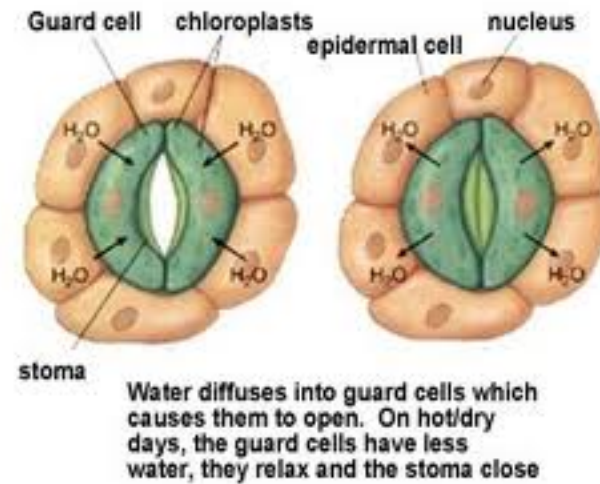
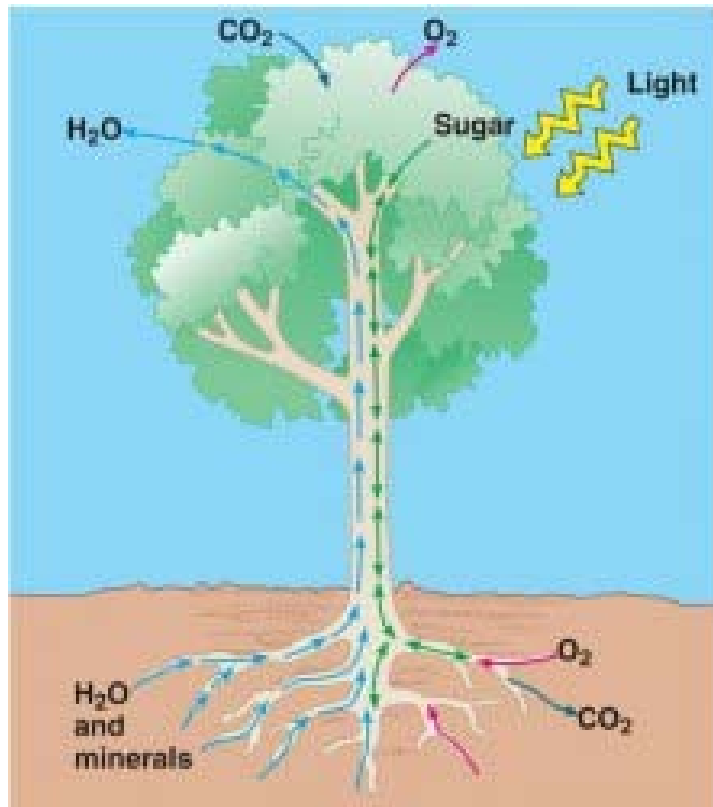
<http://groundwaterwatch.usgs.gov>



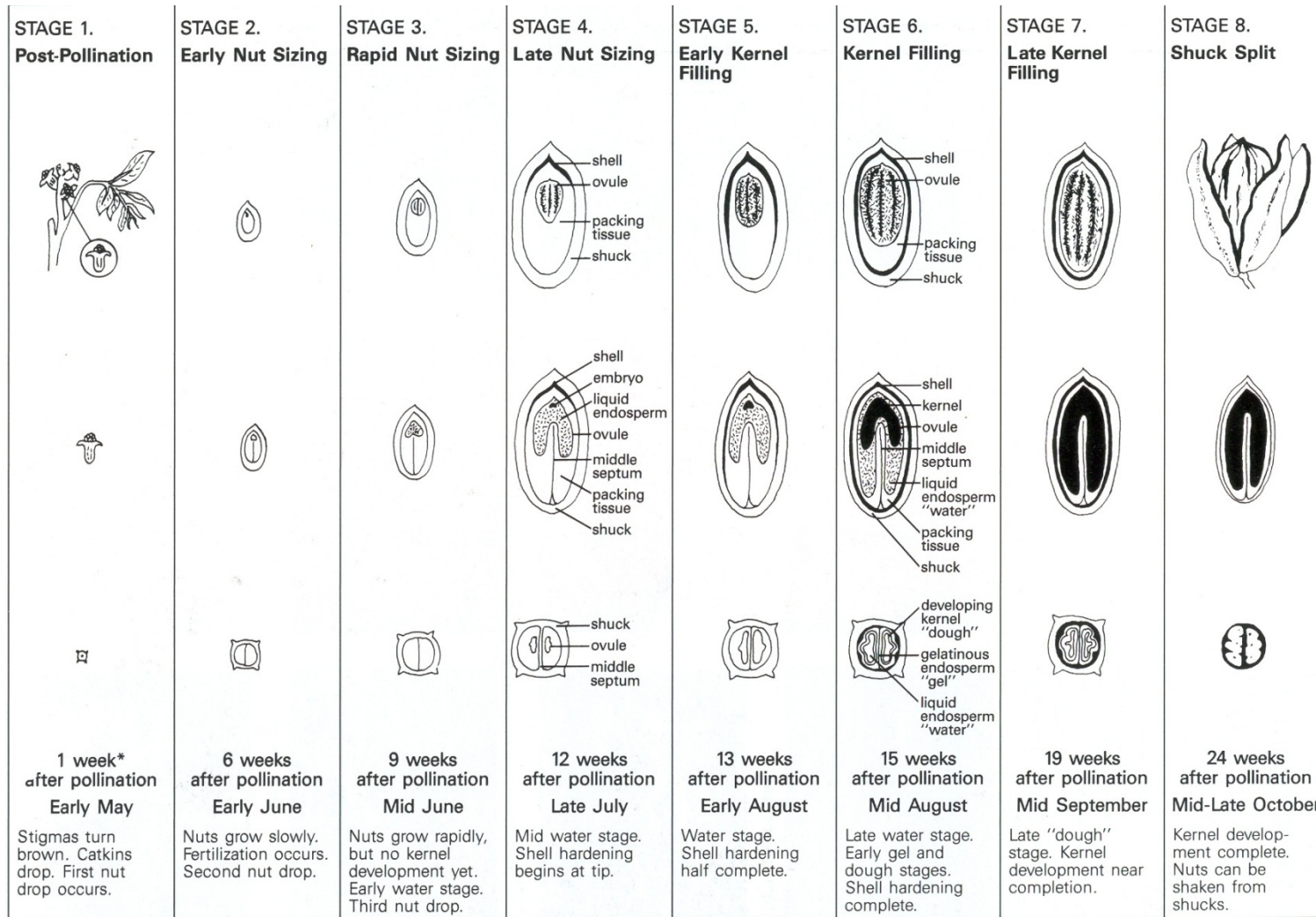
Pecan Water Use

- Pecans extract most of their water from the upper 32 inches of the soil profile
- Need 60” of water per year
 - In the SE, rainfall can account for 50-67% of needs
- Pecan trees can use as much as 350 gal/day
- Greatest demand is during August/September
- Pecan Irrigation systems are designed to be supplemental to rainfall
- At 12 trees per acre, Drip/Microjet system capacity should be 3600-4200 gallons/acre/day

How Do Pecan Trees Use Water?



What happens to pecans when drought occurs:



*Dates vary with season, location, and cultivar. Diagrams modified from Wolstenholme, B. N., and J. B. Storey, 1970. Pecan Quarterly 4(4):15-19.

Fruit-drop Pattern

I = weak flowers,
low energy reserves

II = lack of egg fertilization
or tree regulated

III = problems with endosperm
development

IV = problems with embryo
development

Other Factors:

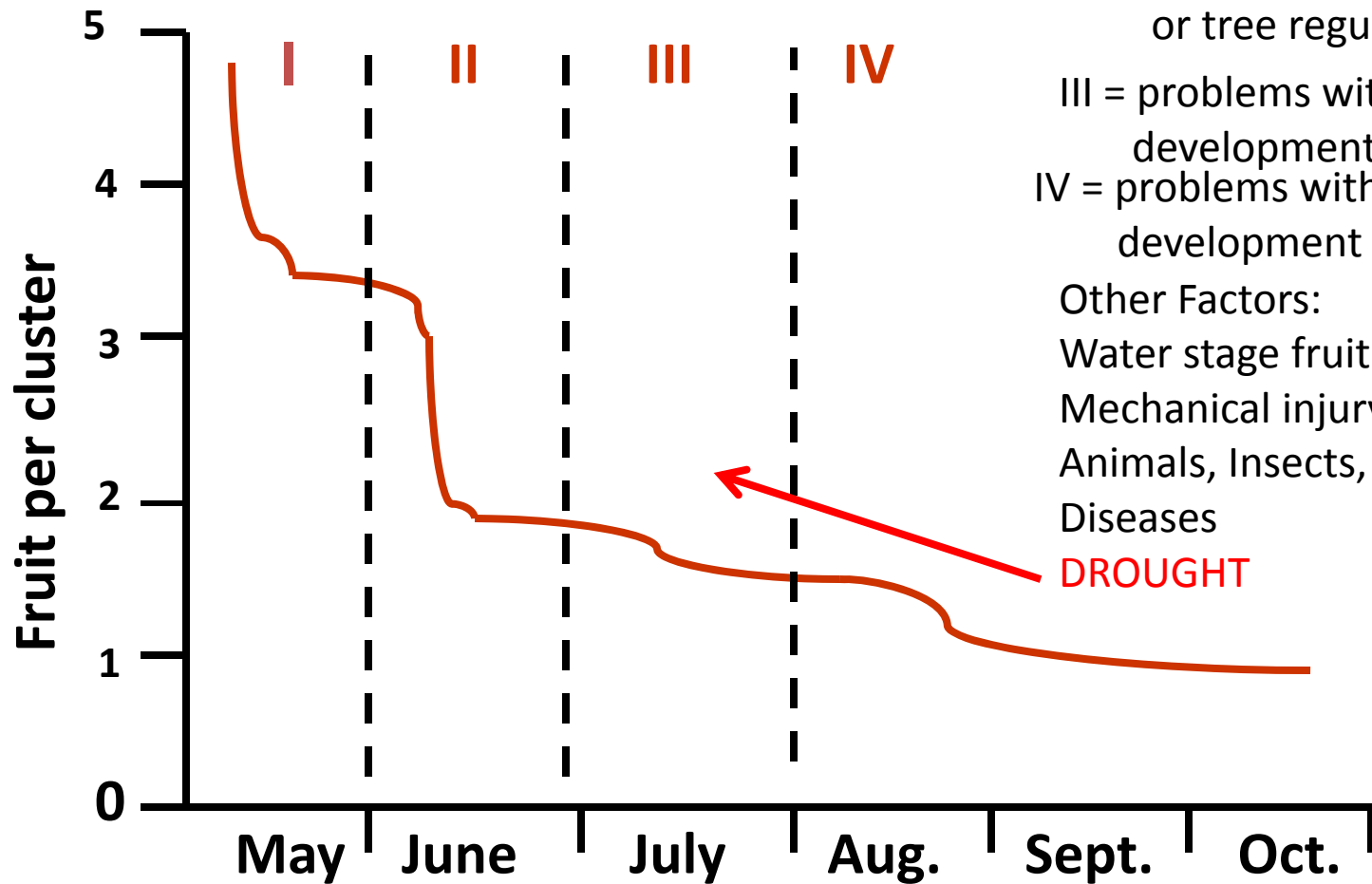
Water stage fruit split,

Mechanical injury,

Animals, Insects,

Diseases

DROUGHT



Fruit Sizing Period

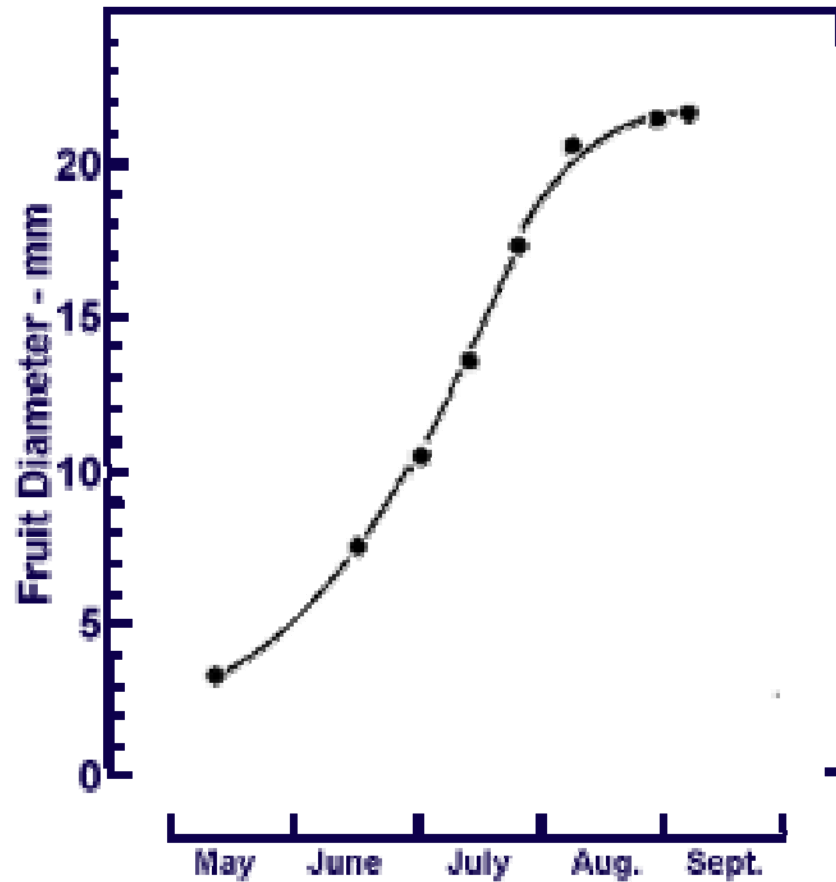
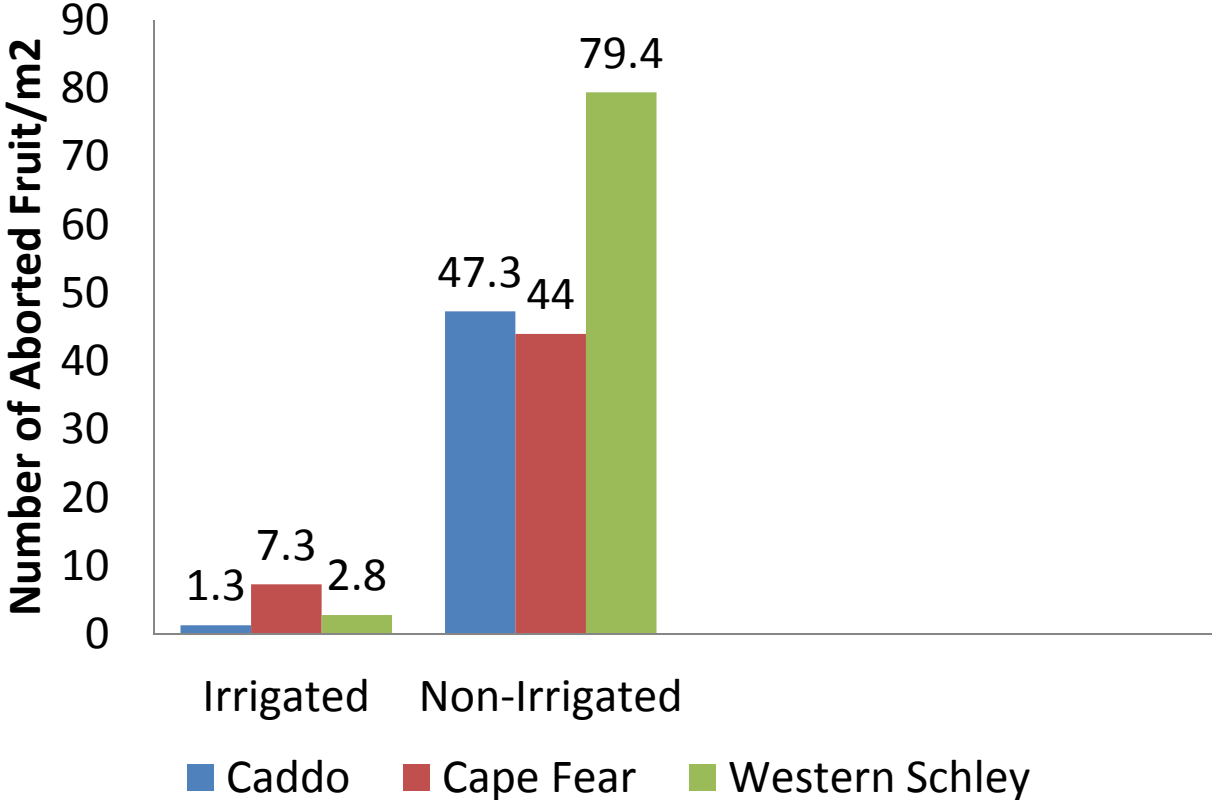


Fig. 1. Growth of the fruit of Schley pecan with time. From G. H. Blackmon (1925).

Nut Sizing

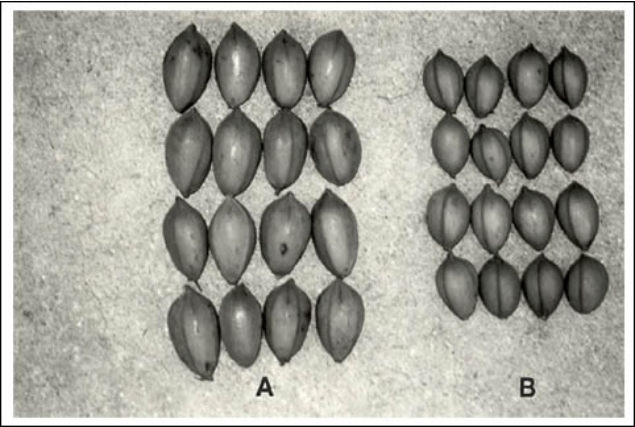
July Drought Results in Greater Fruit Abortion



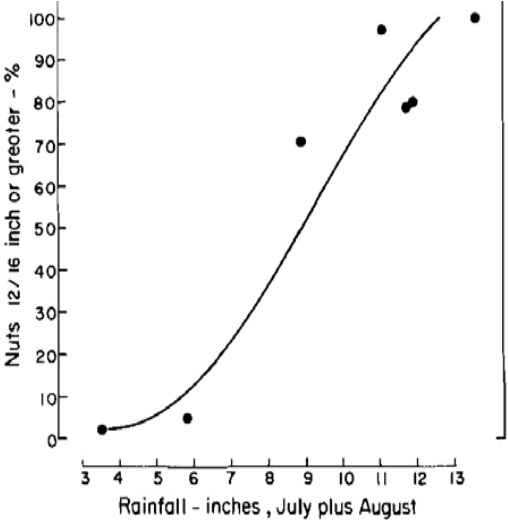
Sparks, 1989

September drought---leaf abscission/poor kernel filling

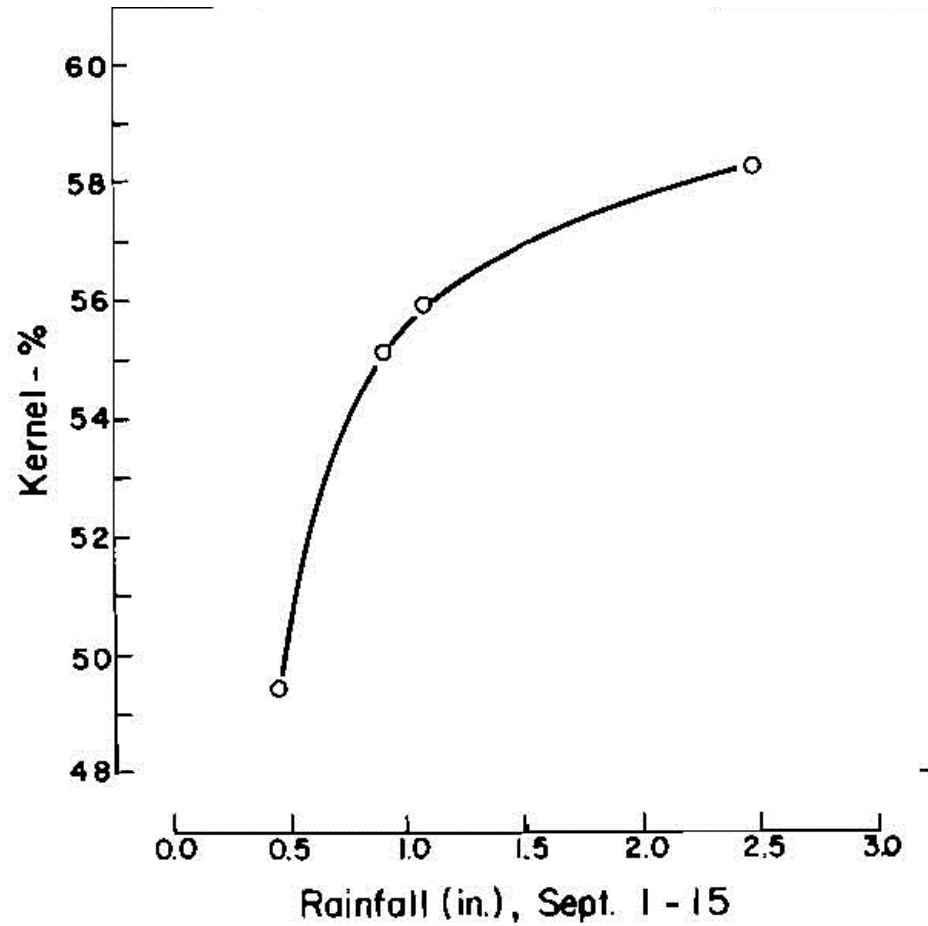
Effect of Drought During Nut Sizing



A=Irrigated
B=Non-irrigated

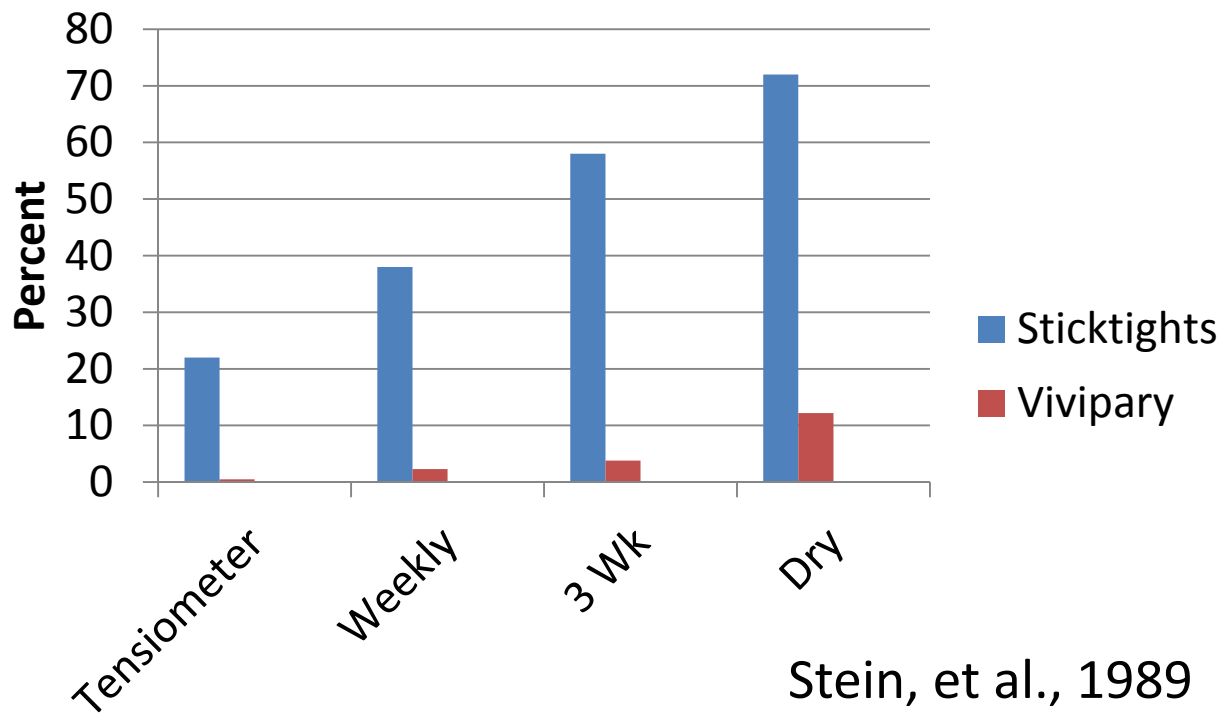


Effect of Drought During Kernel Fill



Sparks, 1992

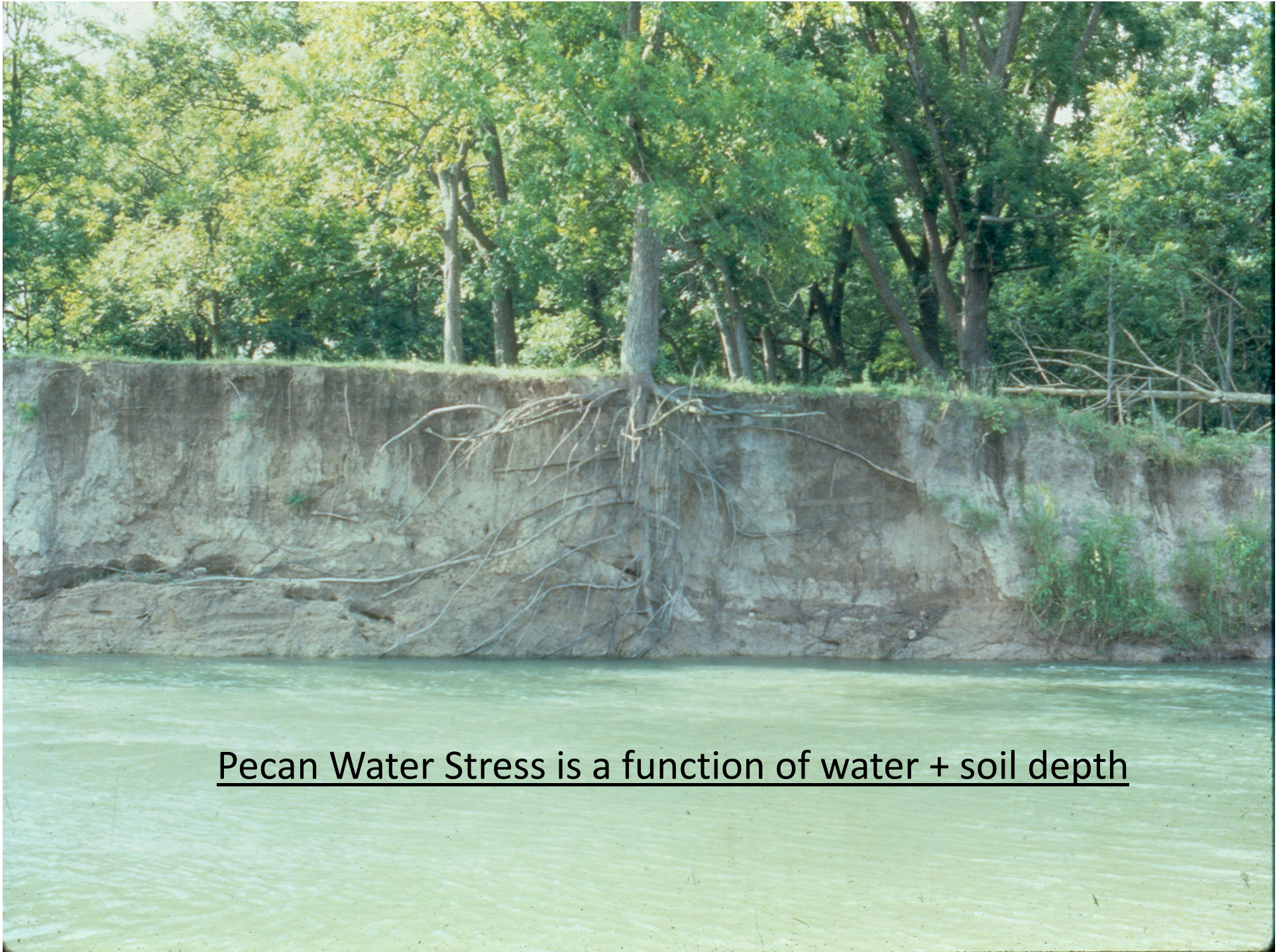




What happened to pecan quality in 2011?

Tifton	From Aug-1	To Oct-31	Total Precipitation [in]	Number of Rainy Days
	2011	2011	12.34	22
2010	2010	6.12	22	
2009	2009	12.73	35	
2008	2008	18.89	30	
1961	1990	10.00	N/A	
1971	2000	10.12	N/A	

Jeffersonville	From Aug-1	To Oct-31	Total Precipitation [in]	Number of Rainy Days
	2011	2011	5.65	21
2010	2010	11.23	22	
2009	2009	20.69	41	
2008	2008	9.95	24	
1961	1990	10.02	N/A	
1971	2000	10.41	N/A	



Pecan Water Stress is a function of water + soil depth

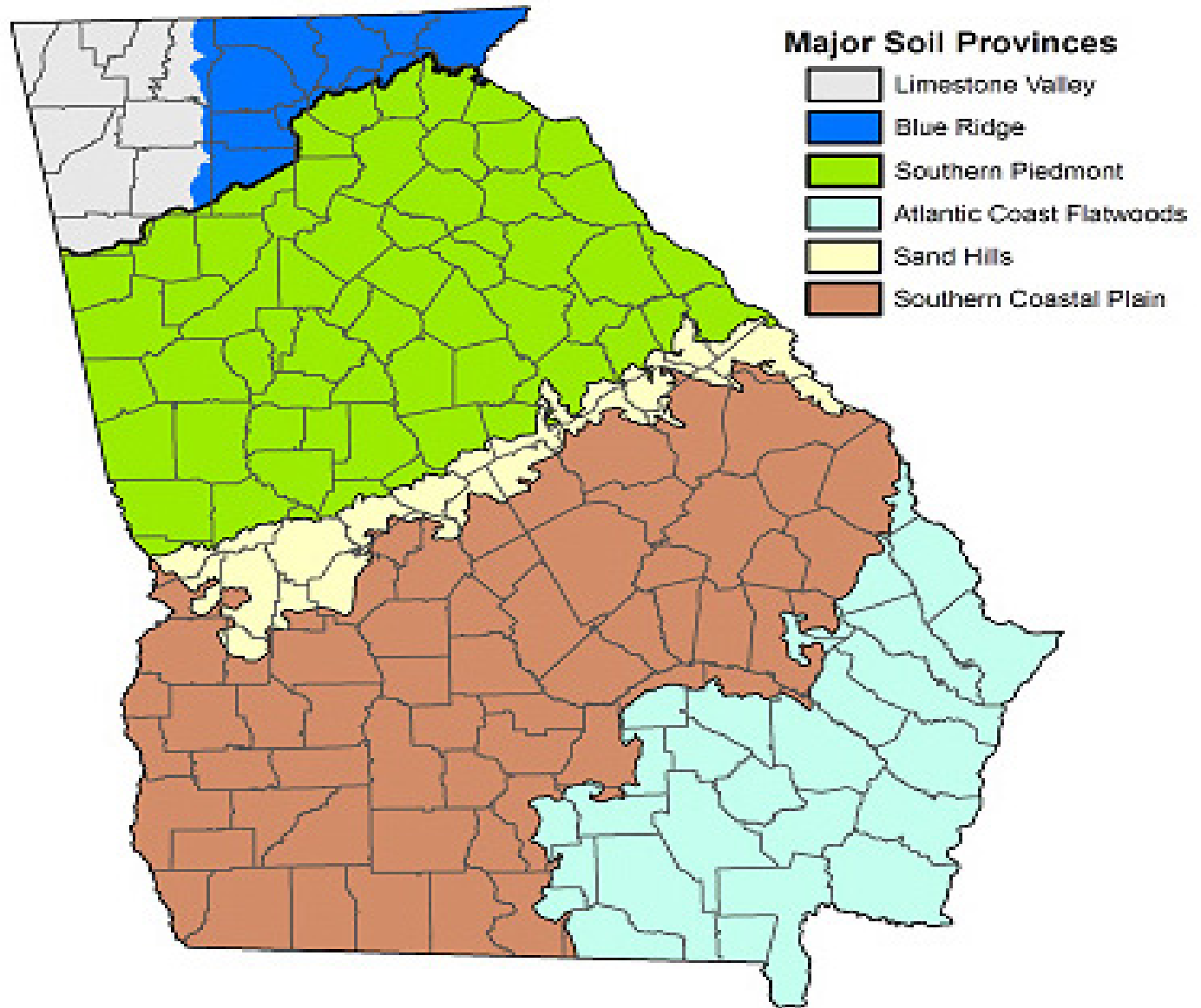
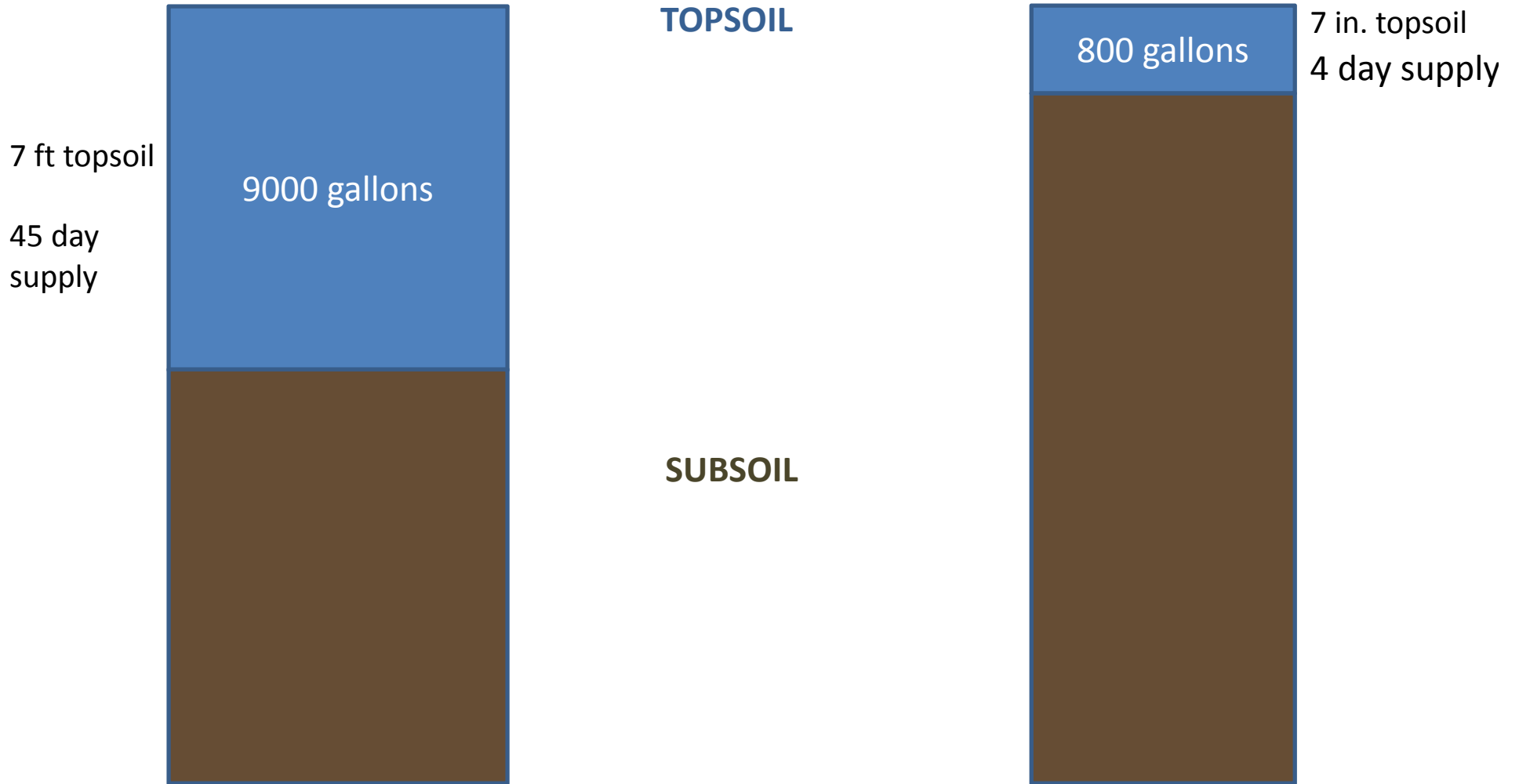


Figure 3. The six soil provinces in Georgia.

Soil Depth & Water



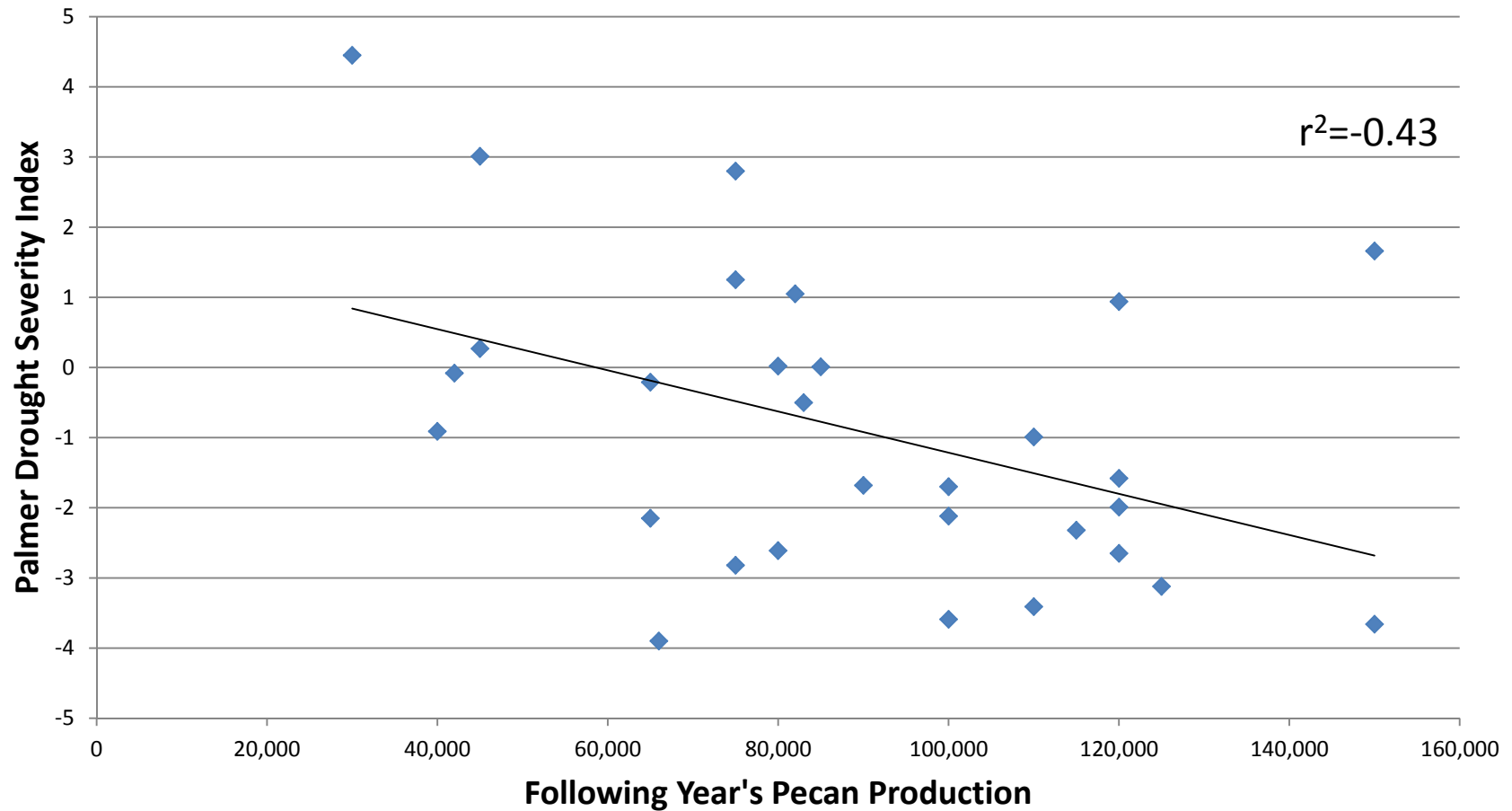
How do we manage pecans under drought conditions?

- Irrigate the orchard
- Fruit Thin
- Don't over-water early in the season

How will the 2011 Drought Affect the 2012 Pecan Crop?



How will the 2011 Drought Affect the 2012 Pecan Crop?



Data from 1980-2011

Extreme Drought = -2.75

Effect of Rainfall on Pecan Production

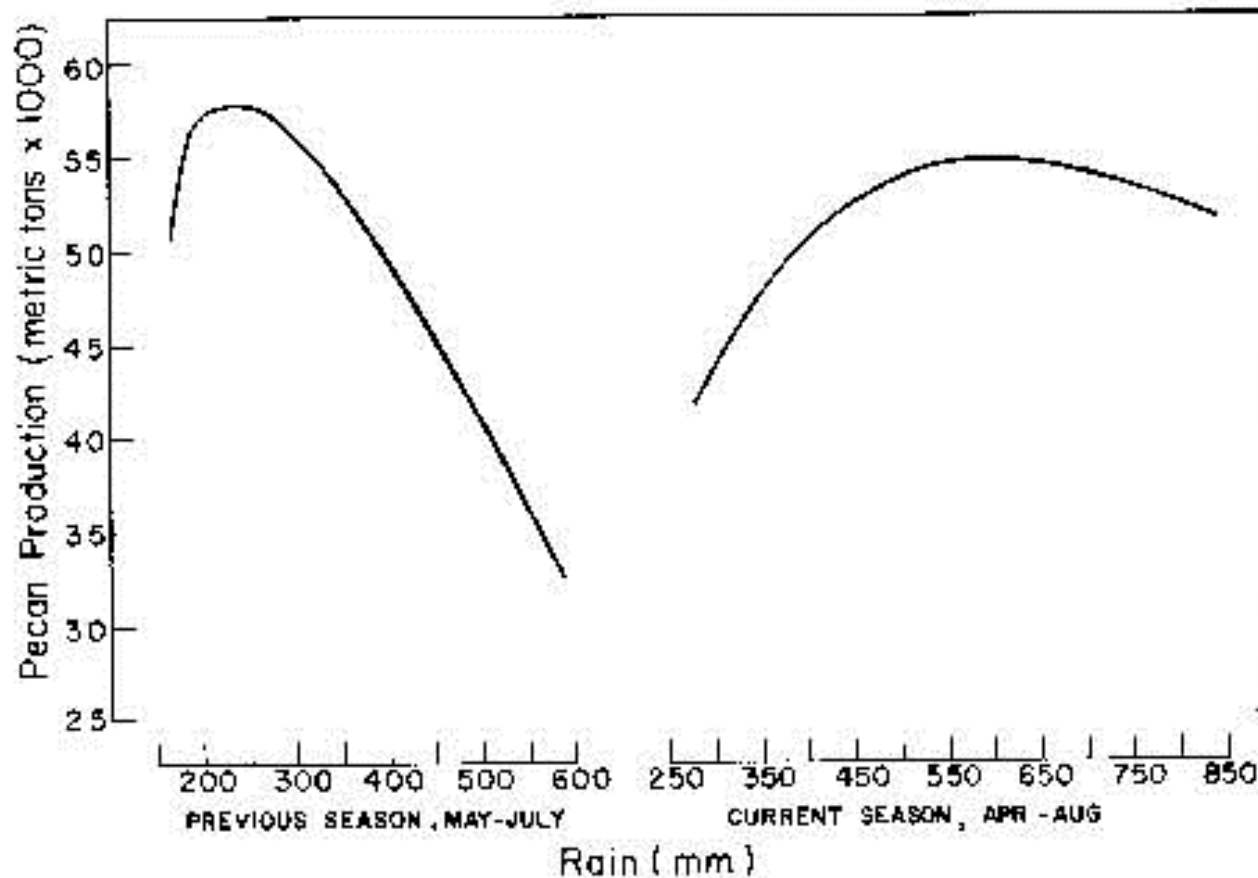


Fig. 7. Graphical relationship of pecan nut production to previous year's rainfall in May-July and current year's rainfall in April-August. Rainfall is cumulative in each interval.